Exhibit IV

Trades List and Supporting Information

Trade Options in priority order:

These trades must be considered for each concept identified in Phase 1 (and addressed in more detail in Phase 2):

Approaches to low mass and power	Mass is the driver on delivering a system to the Martian surface; power sizes the required power system.
Approaches to cuttings removal	Describe approaches to removal of cuttings and cores, both from the hole and at the surface.
Approaches to hole stability	Describe approaches to maintaining hole stability (e.g., cased vs. partially cased holes)
Approaches to solid sample recovery	Describe approaches to recovering cores and/or cuttings, both dry and ice bearing.

These trades should be considered in Phase 2:

Rate of drilling	Discuss rate of drilling as a function of depth and mission lifetime required to reach 100 m, 300 m , and 1 km depths in relevant rock types (as described in Exhibit III).
Bit durability vs. bit replacement	Discuss the strategy for bit replacement or ensuring survival of a single bit.
Approaches to solid sample analysis	Discuss suitability of the drilling method to enable sample analysis downhole vs. on samples brought to the surface. Note that the interest here is in the suitability of the hole to accommodate a variety of geological and astrobiology instruments.
Approaches to fluid recovery	Describe approaches to recovering fluids from depth, address scientific sample quantities (~100 ml).
Required Predrilling Knowledge and site assessment	Discuss what subsurface knowledge is required before drilling. Note what data is enabling and what is enhancing.